1-28. (CANCELED)

29. (NEW) A device (1), for determining the density and air content of an oil sample, the device comprising:

an oil circuit comprising:

a pump (4) and pipe lines (5) for conducting the oil sample through the oil circuit;

an air delivery port (6) for introducing air into the oil circuit;

an air-oil mixer (2) where the air mixes with the oil;

a venturi pipe (9);

a first oil pressure sampling orifice on an upstream side of the venturi pipe and a second oil pressure sampling orifice on a downstream side of the venturi pipe;

a differential pressure sensor (3) connected to the first and second oil sampling orifices; and

wherein the oil sample is delivered to the venturi pipe at a known flow rate, a pressure differential of the oil sample across the venturi pipe (9) is measured by the differential pressure sensor (3) connected with the first and second oil pressure sampling orifices and, based on the known flow rate of the oil sample through the venturi pipe (9) the density of the oil sample is proportionally determined from the pressure differential across the venturi pipe and consequently the air content of the oil is determined.

30. (NEW) The device (1) according to claim 29, wherein the air delivery port (6) is controllable, and the air-oil mixer (2) is installed for turbulent mixing of the air with the oil in the pipe lines (5).

31. (NEW) The device (1) according to claim 29, wherein the oil circuit further comprises at least one separator (15) upstream of the venturi pipe (9) for separating larger air bubbles from the oil sample.

32. (NEW) The device (1) according to claim 31, wherein a diameter of the separator (15) is approximately 20 to 30 mm.

33. (NEW) The device (1) according to claim 29, wherein the air-oil mixer (2) is partially manufactured of glass.

34. (NEW) The device (1) according to claim 29, wherein the air-oil mixer (2) is equipped with a receptacle (14) for surface foam.

35. (NEW) The device (1) according to claim 29, wherein the air-oil mixer (2) and the pipe lines connected to the venturi pipe (9) are arranged within a temperature regulating container.

36. (NEW) The device (1) according to claim 35, wherein the temperature-regulating container has a circulating thermostat.

37. (NEW) The device (1) according to claim 29, wherein the device further comprises an A/D converter map and a calculator and the differential pressure sensor (3) is connected with the A/D converter map and the calculator.

38. (NEW) The device (1) according to claim 29, wherein the pump is a gear pump.

39. (NEW) A device (1), for determining the density and air content of an oil sample as well as the separation behavior of the oil sample over time, the device comprising:

an oil circuit comprising:

pipe lines (5) for conducting the oil sample through the oil circuit;

a compressed air delivery port for introducing air into the oil circuit;

an air-oil mixer (2) where the air mixes with the oil sample;

a venturi pipe (9);

a first oil pressure sampling orifice on an upstream side of the venturi pipe and a second oil pressure sampling orifice on a downstream side of the venturi pipe;

a differential pressure sensor (3) connected to the first and second oil sampling orifices;

the oil sample is delivered to the venturi pipe at a known flow rate, a pressure differential of the oil sample across the venturi pipe (9) is measured by the differential pressure sensor (3) connected with the first and second oil pressure sampling orifices and, based on the known flow rate of the oil sample through the venturi pipe (9) the density of the oil sample is proportionally determined from the

pressure differential across the venturi pipe and consequently the air content of the oil is determined; and

wherein the compressed air delivery port is closed to stop the introduction of air into the oil sample, and a plurality of differential pressures across the venturi pipe (9) are recorded at regular time intervals to determine the separation behavior of the oil sample.

40. (NEW) A method for determining the density and air content of an oil sample with a device having an oil circuit comprising a pump and pipe lines (5) for conducting the oil sample through the oil circuit, an air delivery port for introducing air into the oil circuit, an air-oil mixer (2) where the air mixes with the oil sample, a venturi pipe (9), a first oil pressure sampling orifice on an upstream side of the venturi pipe and a second oil pressure sampling orifice on a downstream side of the venturi pipe, a differential pressure sensor (3) connected to the first and second oil sampling orifices, the method comprising the steps of:

introducing the oil sample into the pipe lines of the oil circuit;

introducing air into the oil circuit and mixing the air with the oil sample in the air-oil mixer (2);

delivering the air and oil sample to the venturi pipe at a known flow rate;

measuring a pressure differential of the mixed air and oil sample across the venturi pipe (9) according to the differential pressure sensor (3) connected with the first and second oil pressure sampling orifices; and

using the measured pressure differential across the venturi pipe to determine the proportionally related density of the mixed air and oil sample according to the known flow rate of the mixed air and oil sample through the venturi pipe (9) and consequently determining the air content of the oil.

41. (NEW) A method for determining the density and air content as well as the separation characteristics of an oil sample with a device having an oil circuit comprising a pump and pipe lines (5) for conducting the oil sample through the oil circuit, a compressed air delivery port for introducing air into the oil circuit, an air-oil mixer (2) where the compressed air mixes with the oil sample, a venturi pipe (9), a first oil pressure sampling orifice on an upstream side of the venturi pipe and a second oil

pressure sampling orifice on a downstream side of the venturi pipe, a differential pressure sensor (3) connected to the first and second oil sampling orifices, the method comprising the steps of:

introducing oil sample into the pipe lines of the oil circuit;

introducing air into the oil circuit and mixing the air with the oil sample in the air-oil mixer (2);

delivering the air oil sample to the venturi pipe at a known flow rate;

measuring a pressure differential of the mixed air and oil sample across the venturi pipe (9) according to the differential pressure sensor (3) connected with the first and second oil pressure sampling orifices;

using the measured pressure differential across the venturi pipe to determine the proportionally related density of the mixed air and oil sample according to the known flow rate of the mixed air and oil sample through the venturi pipe (9) and consequently determining the air content of the oil; and

stopping the introduction of air into the oil sample, and recording a plurality of differential pressures across the venturi pipe (9) at regular time intervals to determine the separation characteristics of the oil sample.

42. (NEW) A method for determining the density and air content as well as the separation characteristics and foam formation of an oil sample with a device having an oil circuit comprising a pump and pipe lines (5) for conducting the oil sample through the oil circuit, an air delivery port for introducing air into the oil circuit, an air-oil mixer (2) where the air mixes with the oil sample, a venturi pipe (9), a first oil pressure sampling orifice on an upstream side of the venturi pipe and a second oil pressure sampling orifice on a downstream side of the venturi pipe, a differential pressure sensor (3) connected to the first and second oil sampling orifices, the method comprising the steps of:

introducing the oil sample into the pipe lines of the oil circuit;

introducing air into the oil circuit and mixing the air with the oil sample in the air-oil mixer (2);

delivering the air oil sample to the venturi pipe at a known flow rate;

measuring a pressure differential of the mixed air and oil sample across the venturi pipe (9) according to the differential pressure sensor (3) connected with the first and second oil pressure sampling orifices;

using the measured pressure differential across the venturi pipe to determine the proportionally related density of the mixed air and oil sample according to the known flow rate of the mixed air and oil sample through the venturi pipe (9) and consequently determining the air content of the oil;

stopping the introduction of air into the oil sample, and recording a plurality of differential pressures across the venturi pipe (9) at regular time intervals to determine the separation characteristics of the oil sample; and

collecting any surface foam of the mixed air and oil sample in a container connected with the oil circuit and measuring a collected volume of the surface foam in the container.